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THE IOWA ACADEMY OF SCIENCE

THE twenty-seventh annual meeting of the academy was held in Alumni Hall, Iowa State College, Ames, beginning at 1:30 P.M., Friday, April 25.

President Pearson, of the Iowa State College, extended a welcome to the academy at 8:00 P.M., Friday. After this the public address on "Wealth from Worthlessness" was given by Dr. Thomas J. Burrill, professor emeritus of botany, University of Illinois.

PROGRAM

(Abstracts are by the authors)

Tramping about Puget Sound: T. H. MACBRIDE.

Pure Lines and What they Mean to Iowa's Grain Crop: L. C. BURNETT.

The Physiology of the Pollen of Trifolium pratense: J. N. MARTIN.

The Comparative Morphology of the Legumes: J. N. MARTIN.

A Preliminary List of the Parasitic Fungi of Boone County, Iowa: H. S. COE.

A Partial List of the Parasitic Fungi of Decatur County, Iowa: J. P. ANDERSON.

The Pollution of Underground Waters with Sewage through Fissures in Rocks: HENRY ALBERT.

The possibility of pollution of underground waters through fissures in rocks has long been a well-established fact. The actual demonstration of such as the source of cases or epidemics of disease in Iowa has until recently not been proved. The more superficial rocks of the state present many joints or fissures. Although the epidemic of typhoid fever in Cedar Falls during 1911 was believed at that time to have occurred as a result of the pollution of waters through fissures in rocks, it is believed now that pollution occurred through a wooden conduit which conducted the water from the spring to the pumping station. The best example that we have of an epidemic no doubt traceable to pollution through fissures in rocks is the epidemic of typhoid fever which occurred at Fort Dodge during the summer and fall of 1912, during which about one hundred persons were affected by the disease. The water supply of Fort Dodge comes principally from the deep wells. They also take the water from pipes beneath the river. The source of infection was apparently both from the pipes beneath the river and from one of the deep wells. The feature of interest is in connection with the latter. This well (well No. 1), which was the first of the three wells as also

the deepest one—being 1,827½ feet deep and extending to the Jordan sandstone—was started at the bottom of a large shaft which was constructed several years previously for the purpose of supplying the city with water. This shaft, which measures 10 × 10 feet across, extends down for 90 feet. From the west side of the lower end of this shaft a tunnel of 9 feet in diameter was extended under the Des Moines River. This tunnel was driven in sandstone, so required but few timbers for support, whereas the shaft has a wooden casing for almost its entire extent. The shaft extends successively from above downward through the following layers of earth:

Alluvial soil and clay	31 feet
Limestone	6 feet
Shale, blue	27 feet
Limestone	6 feet
Sandstone	42 feet ¹

There are only about 20 feet of gravel, alluvial soil and clay from the bottom of the river to the first layer of limestone. Through this the water from the river and surrounding soil will probably pass quite readily and without efficient filtration. It then comes to a layer of limestone which is known to contain many fissures, through which water may readily enter the shaft. Beneath the limestone is a layer of blue shale, 27 feet in thickness. This is relatively impermeable to water, hence tends to keep the water from passing directly downward and so hastens the passage of water laterally along the limestone fissures—in the direction of least resistance—namely, toward the shaft. Previous to the construction of the tunnel the seepage into the shaft was at the rate of about 55 gallons per minute. This was increased to 80 gallons per minute by the construction of the tunnel. This would seem to indicate that the water which enters the shaft is of recent surface origin. That the water must have come principally through such fissures in the rocks is indicated by the fact that when the shaft was constructed but little water appeared until after the limestone layer with its fissures had been entered. That the water which comes from the shaft is polluted with sewage material has been shown repeatedly by clinical and bacteriological examinations. When the first artesian well was drilled (well No. 1) it was started from the bottom of the above-mentioned shaft. The casing of this well extends through the shaft and projects at the

¹ Tunnel in this formation.

top several feet above the level of the water in the shaft. The water flowing from the artesian well fell into the shaft which became filled with water to the top of the discharge pipe. In this manner the water from the artesian well and the seepage water from the shaft and tunnel were mixed. Soon after the completion of this artesian well a sample of this water was sent to us for examination. We expected to find either no bacteria or only a very few. We found, however, that the bacterial count went up to 42 per cubic centimeter with two colonies of colon bacilli. Chemical examination likewise showed evidence of contamination with sewage material. The reason for this was not explained until after a personal inspection and subsequent examination showed that the contamination occurred in the large shaft with water from the shaft and tunnel. The water taken directly from the well did not show any evidence of pollution. We believe that the water of the tunnel and shaft comes largely quite directly from the river through fissures in the rocks and hence is not properly filtered.

Bacterial Activities and Crop Production: P. E. BROWN.

The importance of soil bacteria in bringing about the change of insoluble material containing the essential plant food constituents into forms which are available for the feeding of crops is emphasized as a basis for the assumption that there should be some relation between essential bacterial activities and actual crop production. Determinations of total numbers of organisms using an albumen agar and estimations by the beaker method of the ammonifying power and the nitrifying power of the soils of several series of field plots were made. Comparison of the results of these bacteriological studies with the actual crop yield revealed the fact that in practically every case a soil showing greater numbers of organisms, greater ammonifying power and greater nitrifying power than another soil showed likewise greater crop production. Fresh soil with a solution of casein added for ammonification and a solution of ammonium sulfate added for nitrification allowed of the greatest differentiation according to bacterial activities of the soils tested.

The Monterey Conifers: THOMAS H. MACBRIDE.

A discussion of the distribution and habits of the four conifers, *Cupressus macrocarpa* Hartweg, *Cupressus Goveniana* Don, *Pinus muricata* Don and *Pinus radiata* Don, which are found in the vicinity of Monterey, California.

Quercus borealis Michx. f.: B. SHIMEK.

This is generally regarded as a synonym of *Q. rubra*, but it seems to be quite distinct. The paper contains a discussion of its characters and its distribution in Iowa.

The Sedges of Henry County: JOHN THEODORE BUCHOLZ.

A discussion of the physiography and topography of Henry County with special reference to the distribution and habitats of the sedges, followed by an annotated list of the species found in Henry County.

The Diclinous Flowers of Iva xanthiifolia Nutt.: CLIFFORD H. FARR.

The placing of this species among the Compositæ is favored by the fact that the walls of adjacent stamens unite by the fusion of contiguous cutinized layers. Furthermore, the flowers are arranged in a capitulum in concentric cycles of five flowers each. The outer cycle consists solely of pistillate flowers, and the remaining cycles are made up entirely of staminate flowers. The abortive stamens of the pistillate flower appear after the carpels, and were seen occasionally to have developed into pollen-bearing members. It is evident that the stamens of the marginal flowers, being epigynous, would come in contact with the enlarged ends of the corollas of adjacent staminate flowers and with the apices of the floral and involucre bracts. That this crowding may have caused the abortion of these stamens seems credible. The abortive pistil of the staminate flower doubtless aids in dehiscence by engaging the hook-like tips of the stamens. It possesses no ovary, but early develops a notch on its apex, which suggests its derivation from the typical bifid form. The gynœcium of a flower is more susceptible, both in structure and in function, to the effects of desiccation than is the andrœcium. The central flowers of this form are more exposed than the marginal on account of the following circumstances: their distance from the involucre bracts, their tardy appearance, the minuteness or absence of floral bracts of the disc flowers, the convexity of the receptacle, and the remoteness of the disc flowers from the main vascular supply. It therefore seems that exposure to desiccation through many generations will explain the abortion of the pistil in the disc flowers. Excessive exposure of certain flowers and excessive protection of others are therefore suggested as the major causes for the origin of decline in this species.

The Effect of Smoke and Gases upon Vegetation:
A. L. BAKKE.

Industrial centers have succeeded in having associated with them a large quantity of smoke. Under ordinary conditions the amount of smoke decreases with the increase of the distance from the business center. In making a study of two smoke districts of Chicago it has been found possible to use plants as an index to the amount of smoke present.

Aroid Notes: JAMES ELLIS GOW.

The taxonomy of a number of species of Aroids, chiefly tropical, has been worked out and is here presented for the first time.

Phylogeny of the Monocotyledones: JAMES ELLIS GOW.

Researches on the morphology of the Aroids, with special reference to the phylogeny of the group, have led the author to question the theory as to the primitive character of the monocotyledonous plants; and he here defends the view that the most primitive forms are to be found among the spiral Dicotyledones.

The Grasses of the Uintah Mountains and Adjacent Regions: L. H. PAMMEL.

Brief account of grasses collected in the Uintah Mountains and the adjacent regions based on collections made by the writer during several seasons in which the flora of the region was studied. The paper records the habitats, distribution and abundance of the species.

Notes on the Flora of Johnson County, Iowa:
M. P. SOMES.

An annotated list of plants observed growing in Johnson County, Iowa, comprising 1,008 species, representing 413 genera, included in 101 families. Not including mosses, fungi or the other cryptogams lower than the ferns.

The Electrical Conductivity of Solutions of Electrolytes in Aniline: J. N. PEARCE.

Equilibrium in the System; Cobalt Chloride-pyridine: J. N. PEARCE and THOMAS E. MOORE.

The Osmosis of Optical Isomeres: A. R. JOHNSON.
Observation on the Specific Heat of Milk and Cream: JOHNSON and HAMMER.

A New Design for Specific Apparatus: JOHNSON and HAMMER.

A Proposed Method for Determining the Ratio of Congealed to Uncongealed Water in Frozen Soil: JOHNSON and RAY SMITH.

Factors in Milk Production: FRANK B. HILLS.

By a microscopical examination of many sam-

ples of milk of different fat composition percentages, numerous counts were made of the numbers of fat globules of different sizes. A positive relation was found to exist between the percentage fat composition of the milk and the numbers of globules of different sizes, the correlation coefficient being .19. A study of the tabulated fat records of about 3,700 pairs of variates, taken from the Advanced Register Year Book of the Holstein Friesian Association, showed by a correlation coefficient of .29, evidence of so-called prepotency of dams in the transmission of fat production to their daughters. This would indicate a probable sex linkage of some of the factors in the inheritance of fat production. A rearrangement of the data into groups for the study of the fat production of three consecutive generations of animals showed segregation of fat factors in a 7:1 ratio, giving further evidence of linkage of some of the factors in the inheritance of fat content in milk.

Nitrogen and Chlorine in Rain and Snow: NICHOLAS KNIGHT.

Twenty-six specimens of rain and snow were carefully collected during the year 1911-12, and the amount of nitrogen in the nitrites, nitrates, free and albuminoid ammonia estimated. The amount of nitrogen that an acre of land received from each precipitation was computed. Chlorine was found in each specimen in which it was sought. This must come from the oceans as common salt.

Exhibition of Barograph and Thermograph Readings of the Omaha Tornado: JOHN L. TILTON.

The Limestone Sinks of Floyd County, Iowa: A. O. THOMAS.

Notes on the Nebraskan Drift of the Little Sioux Valley in Cherokee County: J. E. CARMAN.

The Wisconsin Drift-plain in the Region about Sioux Falls, South Dakota: J. E. CARMAN.

Some Additional Evidence of Post-Kansan Drift near Iowa City, Johnson County, Iowa: MORRIS M. LEIGHTON.

The Rock from Solomon's Quarries: NICHOLAS KNIGHT.

A specimen of what is locally known as the "Royal" was received from Jerusalem for analysis. It was of the purest white, soft when first removed from the quarry, but it soon hardens on exposure to the air. The rock is very pure calcium carbonate, with little more than a trace of magnesium carbonate.

Iowan Cretacic Sequence: CHARLES KEYES.

Deposits homotaxially equivalent to the Cretacic, or Chalk, formation of England were first recognized on the American continent along the Big Sioux River in a district which is now incorporated in the state of Iowa. This correlation was almost the first attempt to apply the fossil criteria to the rocks of this country. Less than a decade had elapsed since this means had been formulated by William Smith in England. The use of the method was introduced in 1809 by Thomas Nuttall, an English botanist who during the following year ascended the Missouri River from St. Louis. Notwithstanding the fact that this region was visited repeatedly during a whole century which has elapsed since Nuttall's visit, it has been only within the last year that the complete Cretacic section in Iowa has been with certainty determined. The total thickness of the beds is now known to be not less than 800 feet. It is separable into seven distinct terranes. These are defined as the Nishnabotna sandstones, the Sergeant shales, the Ponca sandstone, the Woodbury shales, the Crill limestone, the Hawarden shales and the Niobrara limestones.

Terranal Differentiation of Devonian Succession in Iowa: CHARLES KEYES.

Upon faunal grounds, as well as for lithological and stratigraphical reasons, the main Devonian limestones of Iowa, or the Cedar Valley formation as they are most widely known, were found more than a score of years ago to be separable into five well-defined terranes. No special geographic names were attached to these several subdivisions. They are, however, commonly recognized as valid by all who have studied the field in detail during the term of years mentioned. Calvin published the general section with these division-lines indicated but he gave no distinctive local designations. The terranes are easily distinguishable over wide areas. For the lower number the title Fayette formation is retained. The others are called the Solon, Rapid, Coralville and Lucas formations. The subdivisions are briefly characterized.

Possible Occurrence of Tertiary Deposits East of the Missouri River: CHARLES KEYES.

Deposits of Tertiary age have never been recognized as occurring within the limits of Iowa. Their presence, however, has long been surmised. The repeated invasions of glaciers have naturally removed nearly all vestiges of any soft rocks which may have existed in pre-glacial times upon the older indurated strata.

The majority of such remnantal deposits are easily mistaken for phenomena connected with the glacial drift-sheets. Yet there are several of these sections along the Big Sioux River, for instance, the beds of which appear not to be of glacial origin. They seem to belong to isolated patches of the Tertiaries which are fully represented in the eastern parts of South Dakota and Nebraska. One pocket in particular, exposed near Sioux City, and called the Riverside sands, now appears to be unquestionably Tertiary in age.

Wright's "Ice Age" on the Genesis of Loess: B. SHIMEK.

In the second edition of Wright's "Ice Age" objections are made to the æolian hypothesis of loess origin. This paper aims to meet these objections, and sustains the æolian hypothesis.

Preliminary Note on the So-called Loess of South-western Iowa: JAMES ELLIS GOW.

This is a discussion of the nature and origin of a clay found in Adair County at the surface of the drift. It contains no gravel or bowlders and in near-by localities has been described as "loess." Investigation shows that it is neither aqueous nor æolian in origin and that it may occur in the Kansan drift at any and all depths.

The Proper Use of the Geological Name, Bethany: JOHN L. TILTON.

The term Bethany Falls limestone, or Bethany limestone, has been used with three different meanings. It properly applies to the second limestone of the section found at Winterset, which limestone is called the Earlham.

A Pleistocene Section from Des Moines South to Allerton: JOHN L. TILTON.

Along the new railroad line from Des Moines to Allerton are fine exposures of the Pleistocene, photographs and descriptions of which should be preserved for reference since the relation of the deposits will very quickly become obscured. The exposures present strong evidence, supported elsewhere, that the so-called "gumbo" was deposited in the closing stages of the Kansan, and that it is but one form of a deposit for which collectively the term Dallas deposits is here suggested. Kansan drift and Des Moines shales are well exposed, but no Aftonian nor Nebraskan. Loess is found only in the northern portion of the area.

Mound and Mound Explorations in Allamakee County, Iowa: ELLISON ORR.

The paper covers in a general way the pre-

historic earthworks found in this country along the Mississippi and Oneota rivers. These earthworks consist of three types, the most common being the Circular Mound. Following that the Long Embankment, these latter sometimes having a length of upwards of four hundred feet, and where found on the bluff tops they uniformly follow the divides separating the gullies and ravines opening into the main river valley. Following these in frequency of occurrence are the Effigy Mounds. It is somewhat difficult to say what particular animal or bird these mounds are intended to represent, but there is quite a variety. Near McGregor is a group of three which are in a very fine state of preservation and were undoubtedly intended to represent the buffalo. Along the Oneota River, but not found on the Mississippi, are embankments in the form of a circle. Some of these are on the bluff tops and some on the river bottoms. It is more than likely that a part of them are the remains of camps fortified with palisades, and others may have been built for some ceremonial purpose. The circular mounds are probably mostly burial mounds, and probably of great age, as no skeletal remains are found in any of them, and there is also a great scarcity of flint or other implements or of pottery.

An Electrical Method of Measuring Certain Small Distances, and Some Interesting Results: F. C. BROWN.

The Variation of the Resistance of Antimonite Cells with the Current Flowing, and the Probable Interpretation of this Variation: F. C. BROWN.

The Change of Young's Modulus of a Soft Steel Wire with Electric Current and External Heating: H. L. DODGE.

Are the Photo-electric High Potentials Genuine: PAUL H. DIKE and F. R. YORK.

Some Dangers in Statistical Methods: ARTHUR G. SMITH.

The Problem of the Vision of an Illuminated Surface: L. P. SIEG.

On the Existence of a Minimum Volume Solution: LEROY D. WELD.

Phase Relations and Sound Beats when the Tones are Presented One to Each Ear: G. W. STEWART.

It has long been known that beats produced by two tones, presented one to each ear, are not quite like the beats produced when the same tones are presented to one of the ears. The experimental arrangement in this experiment was such that the

frequency of beats could be changed, the tones being presented one to each ear, and the difference of phase could be observed optically. The observed results were as follows: When the beats were more frequent than one per second the beats were similar to ordinary beats except that there was no zero intensity minimum. This fact is not new. When the beats became less frequent than one per second, it was possible to persuade the hearer that there was a secondary maximum in the neighborhood of opposition in phase. When the beats became less frequent than one each five seconds the maximum intensity is difficult to select, the secondary maximum being more pronounced. Further, the secondary maximum seems to consist of two maxima, one just before and one just after opposition of phase. The tone at equality of phase is different in quality to that at the secondary maxima, the former being like the tone of the fork and the latter more of a noise. Some observers can not get the effect at all. When one of the tones is received through the teeth with the other received at one of the ears, there appears to be only one maximum, and that at opposition of phase. The proposed explanation involves a combination of a skull tone and an ear tone; but is too complicated to present in an abstract. The theory agrees with the experiments in a quantitative way if the velocity of sound in the skull is from two to three times that in air. The presence of a maximum at equality of phase does not seem to permit of ready explanation if the possibility of interference beyond the cochlea is rejected. The experiments were with forks of frequency 128. The theory should be tested under varying conditions.

The Use of the Rayleigh Disk in the Determination of Relative Sound Intensities: HAROLD STILES.

During the summer of 1912 some experimental work was done at the State University of Iowa by G. W. Stewart and Harold Stiles partly intended to test the Rayleigh disk in the determination of relative sound intensities. The apparatus was mounted on the roof of the new physics building and results obtained experimentally were in close agreement with the theoretical values obtained by Stewart² for sound intensities in the neighborhood of a rigid sphere, the source of sound being on the sphere. Air currents, the inconstancy of the sound source and more particularly the absorption of energy by the Rayleigh

² *Phys. Rev.*, Vol. XXXVIII, No. 6, December, 1911.

disk tube are difficulties in the use of the apparatus.

A more extended account of the work may be found in *The Physical Review*, Vol. I., No. 4, 2d series, April, 1913.

An Experimental Investigation of the Relation between the Aperture of a Telescope and the Quality of the Image Obtained by It: FRED VORHIES.

Through research work carried on at the State University of Iowa, the conclusion has been drawn that astronomers are able to detect certain details upon the planet Mars. A twenty-four-inch telescope, as used by Professor Lowell, seems to be capable of giving these details as distinctly as can be obtained with a telescope of larger aperture.

Helpful and Harmful Iowa Birds: FRED BERNINGHAUSEN.

The Food Habits of the Skunk: FRANK C. PELLETT.

*A Further Study of the Home Life of the Brown Thrasher, *Toxostoma rufens* (Linn.):* IRA N. GABRIELSON.

The paper is a summary of the data obtained by watching from a blind the feeding of the young throughout one day. The total number of feedings was 169, of which 85 were by the male and 84 by the female. The following figures show the percentages of the various insects, etc., which comprised the food. Grasshoppers, 17.51 per cent.; May beetles, 29.95 per cent.; cutworms, 13.36 per cent.; cherries, 8.75 per cent. Miscellaneous insects made up the remainder. From the data at hand it seems that the thrashers are decidedly beneficial.

Nest Boxes for Woodpeckers: FRANK C. PELLETT.

A review of three years' successful experiments in attracting birds that supply no nesting material to artificial nesting sites. Three species not heretofore known to occupy boxes have reared their families in boxes of special pattern.

*On Certain Features in the Anatomy of *Siren lacertina*:* H. W. NORRIS.

Apropos of conflicting statements as to the presence of a maxilla and an opercular (splenial) in the skull of *Siren* the writer finds both present, but in a much reduced condition. Connected with the antorbital cartilage are two muscles (mm. retractor et levator antorbitalis) which with the cartilage form an apparatus for regulating the size of the choana. These two muscles have their homologues in *Amphiuma*. The ramus palatinus

posterior facialis innervates a small vestigial muscle that has its origin on the fascia between the quadrate cartilage and the lateral edge of the parasphenoid bone, and its insertion on the lateral border of the ceratohyal cartilage.

Life History Notes on the Plum curculio in Iowa: R. L. WEBSTER.

A summary of insectary notes on the insect made in 1910 at Ames. These, taken with some field observations made by C. P. Gillette at Ames in 1889, give a fairly accurate account of the seasonal history of the insect in central Iowa.

Additional Mammal Notes: T. VAN HYNING.

The following species to the faunal list of Iowa have been added:

Firmly established: Canada porcupine, *Erethizon dorsatus* Linn.; Lemming mouse, Cooper's mouse, *Synaptomys cooperi* Baird; western harvest mouse, *Reithrodonomys dychei* Allen; pekan, fisher, *Mustella permantii* Erxleben. Now living in the state: American otter, *Lutra canadensis* Sreber; American badger, *Taxidea americana* Boddaert; Canada lynx, *Lynx canadensis* Guldenstadt; American panther, cougar, puma, mountain lion, *Felis concolor* Linn. Additional to the catalogue: chick-oree, small red squirrel, *Sciurus hudsonicus* Pallas; star-nosed mole, *Condylus cristata*.

The following have been listed for Iowa in *Bull. Field Col. Mus. Zool. Sur.*, Vol. 1, and may be looked for: *Peromyscus michiganensis* Audubon and Bachman, wood mouse; *Peromyscus leucopus* Rafinesque, wood mouse; *Tamias quadrivittatus neglectus* Allen, chipmunk; *Scalops argentatus* Audubon and Bachman, mole.

Color Inheritance in the Horse: E. N. WENTWORTH.

Factors are recognized in horse color. The terminology of Sturtevant is used in part. *C* = red or yellow basic pigment, possibly partially diffuse; *H* = Hurst's factor or black; *B* = restriction factor producing bay. This is the principal new feature in the paper. *B* restricts black to the extremities, i. e., eye, mane, tail, lower limbs, etc. The ability of the chestnut horse to carry this factor and in mating to blacks to produce bays explains a phenomenon that has been more or less of a stumbling block. Factors for gray pattern, roan pattern, dappling pattern, white stockings and blaze in face, and for piebald and skewbald markings are identified. Browns are distinguished from bays by the presence of the dappling factor. Tables showing results of over 12,000 matings are appended.

Some Factors Affecting Fetal Development: JOHN M. EVVARD.

The author showed that the size, weight, strength, vigor, character of coat, size of bone and general thrift of the newborn were markedly affected by the nutrition of the dam during the period of gestation. The specific food constituents which when added to corn produced positive results were protein and calcium, both of which (when added to corn) produced larger and heavier offspring than when corn alone was used. The importance of calcium was emphasized by calling attention to the fact that ordinary animals contain practically two thirds as much calcium as of nitrogen in their bodies. Using analytical figures as a basis, the investigation showed that the sow to produce a normal ideal litter would have to eat not less than 13 pounds of corn daily to secure enough calcium for said litter, and this on the assumption that all the calcium was perfectly utilized without any waste whatsoever, no allowance being made for the metabolic uses of the dam herself. The work was done upon sheep and swine. This direct quotation is of interest. "Realizing that the development of the organism may be hindered as early as the embryonic and uterine stages is quite suggestive of a rational diet during the entire period of gestation. Those pregnant animals which are forced to subsist upon grain diets are much more unfortunate than those which have their digestive systems so constituted as to avail themselves of considerable roughage, which, if they be legumes, are very advantageous in the production of vigorous newborn offspring. It is quite fortunate indeed that the mother is able to store in the bones and tissues of her body a considerable amount of material which will tide her over periods of scarcity and enable her to give birth to her young even though the essential constituents are lacking to a large extent in the pregnancy feed."

A Case of Urticaria Factitia: WALTER S. NEWELL.

During a course of elementary experiments in the "tactual localization of a point" it was observed that in the case of Miss M., wherever the tactual stimulus was applied a round welt or wheal arose. These welts, which resembled bee stings, measured from 3 mm. to 5 mm. in diameter and varied in size with the instrument used in giving the tactual stimulus. The sharp corner of a card drawn lightly across the skin produced a line of bead-like welts. The welts appeared within

three minutes after the stimulation and reached the maximum of vividness within five or ten minutes. They remained visible from half an hour to an hour and a half. Tests were tried with Miss M. at different hours of the day and at intervals of several days for a period covering eight weeks. Experiments showed that she exhibited this sensitiveness over widely distributed areas of the body, but no results could be obtained on the finger-tips or on other calloused portions. Most of the observations were made upon the forearm, both on the front and on the back of the arm. A careful study of Miss M.'s nervous organization, with the testimony of several of her instructors, supplied abundant evidence of her instability, and pointed toward a functional disorder caused by "nervous irritability, emotion and hysteria." A striking array of concrete instances of Miss M.'s nervous eccentricities could not be overlooked among the facts most significant in the diagnosis.

Several tests were made to determine whether the "autographisms" could be caused by suggestion or by any means other than actual contact. No results were obtained in this series of experiments, but this may be due to the subject's inability to fixate her attention for any length of time. The lightest contact was followed by the graphism, however, and according to Miss M.'s own testimony she has "known of this sensitiveness since childhood, but has never regarded it as anything unusual."

No attempt was made to use hypnotic suggestion as a means of inducing the graphisms. The subject's introspections are at times contradictory, although quite in accord with her own mental instability. This case throws a sidelight upon the prestige which in another age or in a different environment would be sufficient to lead to all degrees of religious extravagance or fanaticism.

Officers elected for the ensuing year are:

President—C. N. Kinney, Des Moines.

First Vice-president—H. S. Conard, Grinnell.

Second Vice-president—Henry Albert, Iowa City.

Secretary—L. S. Ross, Des Moines.

Treasurer—G. F. Kay, Iowa City.

Elective Members of the Executive Committee—

E. N. Wentworth, Ames; E. J. Cable, Cedar Falls; A. G. Smith, Iowa City.

The next annual meeting will be held at the State Teachers College, Cedar Falls, Iowa.

L. S. Ross,
Secretary

DRAKE UNIVERSITY,
DES MOINES, IOWA